Abstract

In the field of biomedical imaging, the ultrasound (US) B-Scan images are used for tissue characterization. These images are obtained with a simple linear or sector scan US probe, which show a granular appearance called speckle. Speckle is modeled as a signal dependent noise, which tends to reduce the image resolution and contrast, thereby reducing the diagnostic values of the US imaging modality. Over a period, various speckle reduction techniques have been developed by researchers did not represent a comprehensive method that takes all the constraints into consideration. This work addressed the Wiener filtering in wavelet domain with soft thresholding as a comprehensive technique. Also, this paper compares the efficiency of the wavelet-based thresholding (VisuShrink, BayesShrink and SureShrink) technique in despeckling the medical US images with five other classical speckle reduction filters. The performance of these filters are determined by the statistical quantity
measures such as Peak Signal-to-Noise Ratio (PSNR) and Root Mean Square Error (RMSE). The results obtained are presented in the form of filtered images, statistical tables and diagrams. Based on the statistical measures and visual quality of the US B-scan images the Wiener filtering with BayesShrink thresholding technique in the wavelet-domain performed well over the other filter techniques.

Reference

Comparative Study of Speckle Noise Reduction of Ultrasound B-scan Images in Matrix Laboratory Environment

- Wavelet and image processing Toolbox for Matlab commercial package include in Matrix Laboratory (http://www.mathworks.com).

Index Terms

Computer Science

Biomedical
Key words

Speckle Reduction    Ultrasound B-Scan image
Image denoising
Wavelet Thresholding
PSNR and RMSE